

Safety, Human Factors and the Role of the Regulator

“Back to the Future”

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**United Kingdom Civil Aviation Authority
Safety Regulation Group**

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Introduction

The year 2000 was a very busy “human factors in aviation maintenance” year for the Aircraft Maintenance Standards Department (AMSD) of the United Kingdom Civil Aviation Authority Safety Regulation Group (UK CAA SRG). In addition to publishing Airworthiness Notice 71 (Maintenance Error Management Systems), its activities included delivering a series of eight maintenance error management workshops, developing and distributing CAA maintenance error management software as well as compiling and distributing a Handbook on Human Factors and Aircraft Maintenance, all at no charge. These together with a significant contribution to the work of the Joint Aviation Authorities Human Factors Working Group and presentations at various seminars ensured that human factors in aviation maintenance continued to feature high on the list of CAA initiatives designed to further reduce the UK aircraft accident rate.

Culminating with the CAA hosting this, the 15th Annual Human Factors in Aviation Maintenance Symposium, an event shared with the FAA and Transport Canada, the millennium year was a busy but successful time for CAA, one that can be looked upon with some satisfaction.

Looking Back

Given the world-wide commitment to reducing the fatal accident rate, the CAA has, as one of its Human Factor initiatives, undertaken to reduce the number of maintenance errors and to mitigate the consequences of those which remain.

In order to ascertain how UK industry was addressing this already, the CAA, via its Regional Offices, carried out a ‘mini-survey’ of JAR 145 approved organisations to determine whether they

had a Human Factors Programme in place. Of 175 JAR145 organisations, 28 already had a HF programme in place, 30 stated that they were planning to implement such a programme, 111 stated that they had no programme nor was one planned and 6 didn’t know (so they might reasonably be included as “no’s”). Even taking account of those organisations for which a HF programme might not be appropriate, this still left a large number that were doing nothing. It was evident however from comments received that there was a willingness amongst industry to implement HF programmes, if the CAA could provide the appropriate guidance.

Accordingly, CAA implemented a number of initiatives including the training and educating of CAA staff and industry personnel (with the latter being aimed at Accountable Managers) in Human Factors, as well as encouraging industry to adopt formalised Maintenance Error Management Systems (MEMS)

To further this aim, in March 2000 the CAA published Airworthiness Notice 71 (AN71) concerning CAA’s position regarding Maintenance Error Management Systems, as a means of encouraging the introduction of such systems within the aircraft maintenance segment of industry, and promoting a “just” culture rather than a “blame-free” culture.

For the purpose of AN71 a maintenance error is considered to have occurred when the maintenance system, including the human element, fails to perform in the manner expected in order to achieve its safety objectives. The human element includes technicians, engineers, planners managers, storekeepers, in fact any person contributing to the maintenance process.

A key objective of Notice 71 is to provide an environment that encourages the open investigation of events that fall outside of the Mandatory Occurrence Reporting Scheme criteria that otherwise would not be investigated. The Notice provides guidance to industry about maintenance error management systems in respect of the key features of such a system. Recognising that the success of a MEMS programme is dependant upon full and free investigation without fear of action, the Notice documents the assurances CAA is pleased to give in respect of information that emerges as a result of an error management system investigation. It also describes a MEMS related code of practice that the CAA encourages an organisation to adopt with regard to how they may want to deal with their employees in view of findings arising from a MEMS investigation. The Notice provides guidance as to where the 'line in the sand' should be drawn between unintentional error and breach of professionalism, advocating that no-one should be punished for the former, but the latter may warrant action. AN71 indicates that whilst encouraging the open investigation of non reportable errors, it was not designed to create a climate of immunity from action by an organisation or the CAA, who, when deemed appropriate, is required to act in the public interest and the interest of safety.

Airworthiness Notice 71 also makes clear that maintenance error management systems are not mandatory. Such systems would not be approved or audited by the CAA. Our goal is to provide an environment which will allow error management systems to become established in the UK without organisations being fearful of regulatory non-compliance being an issue. Maintenance Error Management Systems are not intended as a replacement for Mandatory Occurrence Reporting or the UK's Confidential Human Factors Incident Reporting Programme (CHIRP), both of which will continue to play an important part in highlighting maintenance errors.

Following on from the publication of AN 71 the CAA delivered a series of free one day Workshops designed to promote a better understanding of the objectives of the Notice. The workshops, centred on SRG's UK Regional Offices, attracted 200 delegates representing some

120 different maintenance organisations, the UK Air Accident Investigation Branch and non executive members of the CAA Board. Delivered

by a team of Airworthiness Surveyors from AMSD the Workshops consisted of a series of modules designed to promote an understanding of maintenance error investigations, a code of practice that focused on organisational issues relative to MEMS, an interactive exercise using the Boeing Maintenance Error Decision Aid (MEDA) and concluded with a demonstration of the CAA software mentioned earlier.

The software was originally developed by BF Goodrich based upon a system they had developed from the Boeing's MEDA investigative aid. BFGoodrich kindly allowed the CAA to modify and anglicise this software and distribute it, free, to all UK organisations to assist them in setting up a Maintenance Error Management System.

The Handbook on Human Factors and Aircraft Maintenance distributed at the Workshop is made up of four parts consisting of;

1. Introducing a Maintenance Error Management Programme into an organisation that includes a chapter based largely upon the United Kingdom Operators Technical Group's "People, Practices and Procedures document".
2. Key references and sources of additional material including training courses and material, and useful documents and websites.
3. Practical guidance material for applying human factors in the workplace e.g., lighting levels in hangars.
4. Bibliography, or, all you ever wanted to know about human factors in maintenance and inspection, but were too afraid to ask.

The document, edited by a Human Factor specialist working within the Operating Standards Division of SRG, is intended to provide practical human factors guidance and supporting information for operational maintenance staff and others working in, or connected with, an aircraft maintenance engineering environment.

It is recognised that the document draws upon the human factors work that has been carried out in the United States of America as described in the FAA's Human Factors Guide for Aviation Maintenance much of which is also relevant to UK and Europe and which we commend to all maintenance practitioners.

With regard to the JAA Human Factors Working Group, CAA has been closely involved through the its two representatives on the Group: a dedicated human factors specialist and a senior Surveyor from the Maintenance Standards Department based at SRG's Heathrow Regional Office. The work of the Group has progressed to the point that their recommendations are incorporated within Notice of Proposed Amendment No 12 to the Joint Aviation Authorities JAR 145 Maintenance Approval code. The purpose of the proposed amendment is to introduce human factor related material into the code which will enable compliance with the amendment to ICAO Annex 6 concerning human factors in maintenance to be achieved.

Looking to the Future

In addition to continuing with the tasks associated with human factors in maintenance initiatives including the recurrent human factor training of its own staff, CAA will continue to encourage the aircraft maintenance industry, through the development of suitable guidance material, on the closer integration of human factor programmes within a Safety Management System (SMS). In respect of SMS the CAA are actively involved with industry in the production of additional pragmatic guidance material relevant to the implementation of Safety Management Systems.

Another CAA objective, recognising the needs of industry for such a document, is to develop the Human Factors and Aircraft Maintenance Handbook into a Civil Air Publication. CAA is also sponsoring two research projects concerning the Working Hours of Aircraft Maintenance Personnel and Safety Health Measures within Maintenance Organisations. The former is in response to concerns expressed by CHIRP that reports of fatigue and excessive duty hours may be leading to errors and affecting safety. The latter project - 'Safety Health Measures' - is a benchmarking exercise whereby one organisation can compare its 'safety health' with another organisation, or over time, to see whether initiatives introduced may have contributed towards improvements in safety.

A further initiative concerns data sharing. CAA, in co-operation with industry and the CHIRP Organisation, are working closely together in the development of a mechanism that will enable the collection and dissemination of maintenance error data, thereby enabling the maintenance industry to

learn the lessons from other organisations' errors, as well as their own, with a view to avoiding similar situations in the future. This data should also assist the CAA to develop more focused human factors strategies, policy and guidance in the areas identified as giving the most difficulties.

Conclusion

From the foregoing it can be seen that the CAA continues to be committed to developing and promoting a better understanding of human factors and the associated tools within industry, thereby leading to a further reduction in the UK aircraft accident rate.